AP Physics 1

Textbook:

Knight, R, Jones, B. and Field, S. *College Physics: A Strategic Approach*. 3rd Edition. Boston, MA: Pearson Education.

About this course:

The AP Physics 1 course will meet for 50 minutes every day. Lab work is integral to the understanding of the concepts in this course. The AP Physics 1 Course has been designed by the College Board as a course equivalent to the algebra-based college-level physics class. At the end of the course, students will take the AP Physics 1 Exam, which will test their knowledge of both the concepts taught in the classroom and their use of the correct formulas.

The content for the course is based on six big ideas:

Big Idea 1 – Objects and systems have properties such as mass and charge. Systems may have internal structure.

Big Idea 2 – Fields existing in space can be used to explain interactions.

Big Idea 3 – The interactions of an object with other objects can be described by forces.

Big Idea 4 – Interactions between systems can result in changes in those systems.

Big Idea 5 – Changes that occur as a result of interactions are constrained by conservation laws.

Big Idea 6 – Waves can transfer energy and momentum from one location to another without the permanent transfer of mass and serve as a mathematical model for the description of other phenomena.

Evaluation:

Students will get grades on homework, quizzes, laboratory work, projects, and exams. Exams are typically worth 100 points and will consist of questions similar to ones students will see on the AP Exam. Homework assignments and quizzes will consist of problems from the textbook, supplements, and old AP Exams. Projects are long-term, and typically will involve groups of students developing a plan, collecting data and/or research, and presenting conclusions in a meaningful way. Laboratory work is student centered and inquiry based and is discussed below.

Grades will be determined by taking the number of points a student has earned and dividing it by the total number of points that the student could have achieved. This decimal is multiplied by 100, and that will be the student's grade.

Topics Covered:

1. Kinematics (Big Idea 3)
    a. Vectors/Scalars
    b. One Dimensional Motion (including graphing position, velocity, and acceleration)
    c. Two Dimensional Motion
2. Dynamics (Big Ideas 1, 2, 3, and 4)
    a. Newton's Laws of Motion and Forces
3. Energy (Big Ideas 3, 4, and 5)
    a. Work
    b. Energy
    c. Conservation of Energy
    d. Power
4. Momentum (Big Ideas 3, 4, and 5)
    a. Impulse and Momentum
    b. The Law of Conservation of Momentum
5. Universal Law of Gravitation (Big Ideas 1, 2, 3, and 4)
    a. Circular Motion
6. Rotation (Big Ideas 3, 4, and 5)
    a. Rotational Kinematics
    b. Rotational Energy
    c. Torque and Rotational Dynamics
    d. Angular Momentum
    e. Conservation of Angular Momentum
7. Simple Harmonic Motion (Big Ideas 3 and 5)
    a. Simple Pendulums
    b. Mass-Spring Oscillators
8. Mechanical Waves and Sound (Big Idea 6)
9. Electrostatics (Big Ideas 1, 3, and 5)
    a. Electric Charge
    b. The Law of Conservation of Electric Charge
    c. Electrostatic Forces
10. Circuits (Big Ideas 1 and 5)
    a. Ohm's Law
    b. Kirchhoff's Laws
    c. Simple DC Circuits

Laboratory Activities:

Twenty five percent of the course will be lab work. Labs may take several in-class days to finish, and students may have to do work outside of class as well.

Students are expected to keep a lab notebook where they will maintain a record of their laboratory work

Every major unit will have an inquiry-based lab, and inquiry-based labs will make up no less than half of the laboratory work.